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RESEARCH ARTICLE

The Graphic Schemata Drawings of Children Using Golomb's Representational Theory

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ABSTRACT

This study intends to study primary schools' children's graphic schemata drawings developments using Golomb's representational theory. The graphic schemata drawing of 7-8, 9-10 and 11-12-year-old children was examined based on the stimulus given to them. Children's drawing responses were observed in terms of representational activity marks such as line, shape and colour. The subjects were 384 from primary schools. Stimulus materials consisting of a theme "A Garden with Trees, Flowers and Insects" were given to the children to complete their drawings. The statistical analysis uses frequencies, percentages, and chi-square measurement to analyse the drawings of the children. The analysis indicates that the three key aspects of Golomb's representation have similarities and differences based on each group of young children's age. The findings revealed that Golomb's representational theory were significant to the primary schools' children's age group. Hence, it can be concluded children's creative and intellectual development is positively impacted.

Contribution/Originality: This study documents on primary schools children's creativity through the use of activity marks namely line, shape and colour. The findings of this research can help to enhance the Malaysian Art Education curriculum. Also, it could help to improve the Art Education policies for a quality learning.

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1. Introduction

Children's drawings are always filled with wonder and delight. Children develop their ideas through exploration of their surroundings and by communicating with adults through drawing, play or other experiences (Golomb, 2004). Drawing helps children to organize their ideas better by making meaning from their experiences. Drawing is preceded by various senses of explorations then the drawing events found to be more expanded and continued Furthermore, children express their emotions, life experiences and cognition in their drawings (Chen, 2018; Yu & Nagai, 2020). Wan (2019) explains that children's art activities are significant for them to identify themselves and the world that helps to develop children's mental and physical development. As an art educator, it is important to understand theories related to children's artistic development. Or else, art educators are unable to create suitable lesson plans to encourage children's mental and physical growth (Toku, 2020). Also, Sunday and Conley (2020) agreed that it is important for teachers to develop practices that can help them to understand what children are thinking about so that they can plan a comprehensive curriculum accordingly.

Many art educators and philosophers have different opinions on the best ways to teach art to young children and about artistic learning (Derham, 1961; Eisner, 1988; Lowenfeld & Britain, 1987, Seefeldt, 2002; Wright, 2003; Gardner, 2004; Twigg & Garvis, 2010). Similarly, Efland (1990) who emphasizes at the core of this discussion are the appropriate methods for teaching art to young children and the significance of art in the curriculum. Complications arise from the fact that art education itself does not have a cohesive organisational structure. Some even criticized the narrowing of the art education curriculum and the focus on core subjects by ignoring this subject may affect children's creativity (Cultural learning alliance, 2020).

Drawing activity can also raise the creativity, confidence level among children, interaction with other children and they can be able to express themselves (Taisin, 2018). However, the Malaysian education system is based on the traditional examination culture, curriculum changes in assessment that place an emphasis on students' profiles, achievements, development, and participation in the learning process have challenged teachers' beliefs. Visual Art Education is acknowledged as an elevated subject that lacks an ideal rubric and assessment system to evaluate students' performance and development (Yeh, 2021). Similarly, a study by Abu Hassan and Yusof (2018), the findings showed that that teacher options, teaching experience and the problems often faced by teachers are related. This relationship gave an impact on the teaching and learning process of Visual Arts Education. This has an impact on interest and the teaching and learning process in the classroom. Additionally, typical classroom instruction has resulted in a lack of art knowledge, which has limited students' ability to develop as artists and their understanding of art, contributing to Malaysia's visual art problem (Ponijan et al., 2019).

These days' art is not considered as a part of early childhood education which should be given equal importance. The role of art education in primary and secondary schools has been a topic of debate. Teachers need to help to provide learning in a natural environment for the children. Each educational institution should have a goal to give children opportunities to grow, and to provide them with characteristics that can be impactful (Said et al., 2017). Also, without adequate training and experience, teachers who are not art opsonists are teaching arts education programs in classrooms, concerns

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that were raised by Abdullah (2013) and Tao (2021). As a result, when compared to qualified art education teachers, those teachers lack experience and skills in the field of visual art education (Liau, 2018; Tao, 2021). Nevertheless, within the Malaysian Art Education, teachers are restricting children's creativity (Hanafi et al., 2013). Other than that, when schools cut budgets, art is usually the first subject to overhaul. It seems that schools don't appreciate the importance of art in building children's artistic development (Aizan, 2013). Furthermore, no previous study was done based on Golomb's (2004) representational theory in analyzing children's drawings in Malaysian context compared to other common children artistic development theories namely Lowenfeld and Brittain (1987) and Kellogg (2015) (as cited in Tao, 2021).

1.1. Research Objectives

i. To quantify the most common Golomb's representational theory that children used in their drawings of a garden with trees, flowers, and insects;
ii. To determine the use of Golomb's representational theory in children's drawings a garden with trees, flowers, and insects according to their age; and
iii. To measure the relationships between children's uses of Golomb's representational theory in graphic schemata drawings with their age.

1.2. Research Hypothesis

Golomb's representational theory has influenced the primary school children's growth in their artistic development of the graphic schemata drawings.

2. Literature Review

Children's art is a form of visual communication and a way for children to explore their imagination, emotions, and perceptions of the world around them. It can encompass a wide range of styles, techniques, and subjects, reflecting their developmental stage, interests, and experiences. "The Graphic Development of Two Artistically Gifted Children: The Drawings of Nadia and Eytan" (Golomb, 1987) is a study that explores the artistic progress of two exceptionally talented young artists, Nadia and Eytan. The study analyses the children's' drawings across various developmental stages to gain insights into the intricate interplay of creativity, style, and individuality. By examining the visual narratives, the study offers a glimpse into the intricate tapestry of childhood imagination and highlights the diverse avenues through which artistic prowess manifests. The comparative study of Nadia and Eytan's artistic development reveals how they channel their innate talents into captivating visual stories that reflect their unique perspectives on the world. Furthermore, Golomb and Helmund (1987) re-examined the relationship between artistic expression and the developmental journey of young children. By delving into this dynamic connection, the study offers fresh perspectives on how art serves as a mirror to children's cognitive, emotional, and sensory growth. Through a comprehensive analysis of their artistic endeavors, the research sheds new light on the intricate fusion of artistic exploration and developmental milestones. The study revisits the developmental inquiry to unravel the multifaceted ways in which children's art captures their evolving comprehension of the world, echoing their emotions, experiences, and intellectual maturation. This inquiry serves as a bridge between the realms of creativity and growth, revealing how children's art not only mirrors their internal worlds but also acts as a catalyst for their holistic development.

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In another study by Golomb (1990), the writer provides a captivating exploration into the artistic journey of Eytan, a young prodigy in the world of visual expression. The study delves into the unique trajectory of Eytan's artistic development, tracing the evolution of his exceptional talents from their early manifestations to their current refined state. Through an intricate analysis of his artworks, the study unravels the nuanced interplay between his innate creative aptitude and his maturing artistic techniques. Eytan's artistic odyssey serves as a fascinating case study, illuminating the remarkable fusion of imagination, skill, and personal growth. This exploration offers an inspiring insight into how precocious artistic talents can blossom into captivating visual narratives, showcasing the innate potential residing within gifted young artists like Eytan. Similarly, "Art and the Young Child: Another Look at the Developmental Question" is a study that takes a fresh perspective on the intersection between children's artistic expression and their developmental journey. By revisiting this complex relationship, the study offers new insights into how art acts as a mirror to children's cognitive, emotional, and sensory growth. Through an in-depth analysis of their artistic endeavors, the research sheds light on the intricate fusion of artistic exploration and developmental milestones. This re-examination prompts a deeper understanding of how children's art not only reflects their internal worlds but also catalyzes their holistic development, bridging the realms of creativity and personal growth (Golomb, 1992).

A study by Golomb (2007) offers an insightful exploration into how individuals perceive and depict the world through artistic expression across different dimensions. The study takes a developmental lens and delves into the evolution of representational concepts in both two- and three-dimensional artistic mediums. By examining the progression of artistic styles and techniques, the research illuminates the cognitive and perceptual shifts that occur as artists' transition from two-dimensional drawings to more intricate three-dimensional creations. This investigation provides a nuanced understanding of how artists' conceptions of space, depth, and form evolve over time, reflecting their cognitive maturation and artistic growth. As a conclusion, the findings showed that there is significant development of children's artistic development.

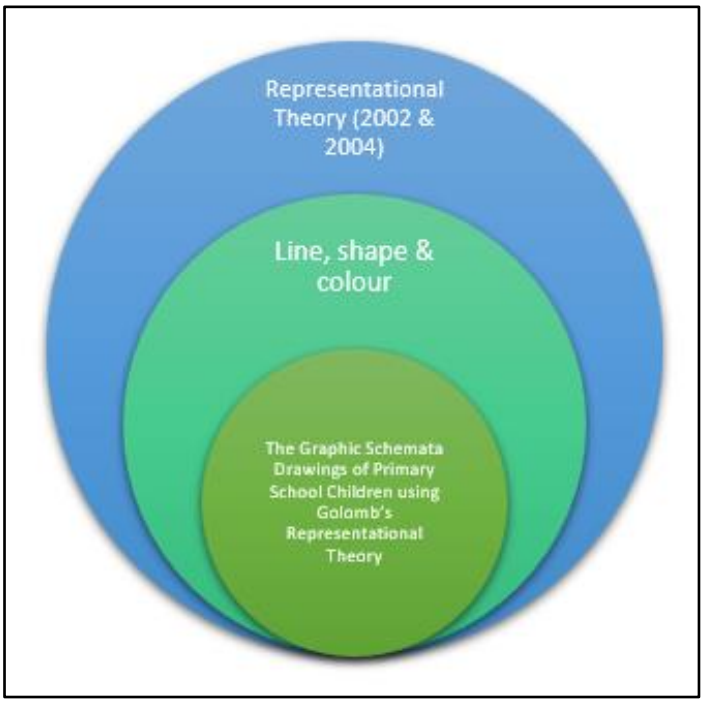
2.2 Background of theory and theoretical Framework

Golomb's (2004) concept highlights the value of children's artistic creations as a means of communication and self-expression. The author argues that children's artwork is a unique expression of their feelings, experiences, and thoughts rather than simply a mirror or copy of the outer world. According to the writer, representational development occurs in stages in children's art. The young children may create simplified, symbolic schematic drawings that depict the essential traits of objects or people. By using more accurate and detailed representations, children can depict objects more authentically.

The theoretical framework was developed to investigate the children's drawings. Golomb (2004) also highlights the importance of the children''s imaginations and uniqueness in their artwork. The author claims that children commonly communicate their vivid inner worlds and creative ability in their drawings by using imagination, symbolism, and personal experiences. This theory often emphasizes the significance of children's artwork as a window into cognitive, emotional, and imaginative development. By looking at and understanding children's artistic representations, one might discover more about the worldviews and unique points of view. The criteria to evaluate children's drawings are line, shape and colour, as shown in Figure 1 were used in this research.

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Figure 1: Theoretical framework developed by the researchers



3. Research Methods

The research design used in this study is quantitative research whereby the researcher applied numerical measurements (Muijs, 2022). To make the collection and analysis of data possible for this study, a method consisting of the following was developed. The subjects were given a stimulus "A garden with trees, flowers and insects". The practice of using stimuli as drawing models in studies was initiated in previous children's drawing research by Koppitz (1968), Horovitz et al., (1973) and Golomb (1983, 2004). The aim of this research was to collect children's drawings to achieve the research objectives. The drawing activity was carried out during normal school hours outside of the classrooms.

The task of the experiment was to draw a theme provided by the researcher. Each subject was asked to draw individually on the given theme on the A4 drawing sheet using 2B pencil and later were asked to colour using colour pencils. An eraser was also provided for use during the experiment. After drawing, children were asked to colour using colour pencils. All drawings were done on a student desk. The drawing process took 45 minutes depending on the grade (year) level. This quantitative study used a sample of 384, consisting of children from grade (year) one to grade (year) six. The calculation of sample size was determined using Krejcie and Morgan (1970). In selecting the samples for this study, the researcher used a random sampling method. The subjects were classified in three age-groups namely Group A (N= 85), Group B (N=123) and Group C (N=176). A complete breakdown of subjects' statistics is shown in the Table 1.

Table 1: Categories of sample

Year	Age	Group
1 & 2	7 to 8	A
3 & 4	9 to 10	B
5 & 6	11 to 12	C

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The data collection took place in July-August 2022, except for some intermittent public holidays the collection was done continuously during the school sessions. To analyse the data collected, the researcher employed a non-parametric test. Frequencies and chi-square were employed in analysing the collected data. A frequency was used to identify the number of times a data value occurs through observation recorded in a study (Muijs, 2022; Obilor, 2022). The researcher used the chi-square test of independence to test the relationships between the three categorical variables of Golomb's representational theory namely line, shape and colour and the primary schools' children's age.

4. Results

4.1. What is the most common Golomb's representational theory that children used in their drawings of a garden with trees, flowers, and insects?

As illustrated in Table 2, the descriptive statistics shows percentages of three Golomb's representational theory that children from Year 1 to Year 6 used in their drawings. The total number of students participated in this activity was *N*=384. The findings from Table 2 showed that most common element used by children is line with the greatest percentage of 35.68% (137 out of 384). Therefore, the most common element that children drew in their drawings of a garden with trees, flowers, and insects is line (E1).

Table 2: Percentages for Golomb's representational theory that children used in their drawings of a garden with trees, flowers, and insects

Golomb's Representational theory	Number of children	Percentage
E1	137	**35.68%**
E2	124	**32.30%**
E3	123	**32.03%**

N=384
Key: E1= Line; E2: Shape; E3: Colour

The result indicated that it is very likely to show as children use line in their drawings. The second most common element used is shape (E2) with the percentage of 32.30% (124 out of 384) followed by colour (E3) with a percentage of 32.03% (123 out of 384). Children are always attempting to comprehend their surroundings as they become older, as stated by Eisner (1972) and D'Amico (1942). Children start to depict elements of their world in their drawings when they are between the ages of three and four. Around this period, representational shapes and individuals start to appear in children's drawings. In this age group, children create representational art using simple, two-dimensional shapes. Furthermore, Lowenfeld and Brittain (1987) attribute up the idea that children becoming more aware of their surroundings and themselves is typically a sign of cognitive growth. This growing awareness is reflected in their artwork in the details they chose to incorporate (Lark-Horovitz, et al., 1999).

4.2. What is the use of Golomb's representational theory in children's drawings of a garden with trees, flowers, and insects according to their age?

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In order to provide a picture of the use of Golomb's representational theory in children's drawings of a garden with trees, flowers, and insects according to their age, the three elements were cross-tabulated with age groups, as shown in Table 3.

Table 3: Percentages for Golomb's representational theory that children used in their drawings of a garden with trees, flowers, and insects according to their age

Golomb's Representational Theory	Group A		Group B		Group C		Total
	Year 1						
	Year 2		Year 3	Year 4	Year 5	Year 6	
E1	15	13	21	24	31	33	137
	38.47%		36.21%		36.47%		
	28.26%		36.92%		36.26%		35.68%
E2	11	18	19	22	25	29	124
	28.21%		32.76%		29.41%		
	39.13%		33.85%		31.86%		32.30%
E3	12	16	18	19	29	29	123
	30.77%		31.03%				
	34.78%		29.23%		34.11%	34.11%	32.03%

N=384
Key: E1= Line; E2: Shape; E3: Colour

Based on Table 3 findings, there aren't many differences between how Golomb's representational theory is applied in children's drawings from Year 1 and 2, Year 3 and 4, and Year 5 and 6. The number of children decreased with age groups for Groups A, B, and C, as shown in Table 3 respectively. As a result, it makes sense to divide the years (A, B, and C) into three major groups.

As illustrated in Table 4, descriptive statistics presented the distribution of the use of Golomb's Representational Theory for Group A children's drawings of a garden with trees, flowers, and insects. Based on the Table 4, a total of 85 children in Group A, 34.12% applied shape, whereas 32.94% applied line and colour respectively. It is found that primary school children from Group A are frequently used shape in their drawings.

Table 4: Percentage for the use of Golomb's Representational Theory in Group A children's drawings of a garden with trees, flowers, and insects

Golomb's Representational Theory	E1	E2	E3
Group A	28	29	28
	32.94%	34.12%	32.94%

N=85
Key: E1= Line; E2: Shape; E3: Colour

As illustrated in Table 5, descriptive statistics presented the distribution of the use of Golomb's Representational Theory for Group B children's drawings of a garden with trees, flowers, and insects. Based on the Table 5, a total of 123 children in Group B, 36.59% applied line, 33.33% applied shape and 30.08% applied colour. It is found that primary school children from Group B are frequently used line in their drawings.

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Table 5: Percentage for the use of Golomb's Representational Theory in Group B children's drawings of a garden with trees, flowers, and insects

Golomb's Representational Theory	E1	E2	E3
Group B	45 36.59%	41 33.33%	37 30.08%

N=123
Key: E1= Line; E2: Shape; E3: Colour

As illustrated in Table 6, descriptive statistics presented the distribution of the use of Golomb's Representational Theory for Group C children's drawings of a garden with trees, flowers and insects. Based on the Table 6 a total of 176 children in Group C, 36.36% applied line, 32.95% applied colour and 30.68% applied shape. It is found that primary school children from Group C are frequently used line similarly to Group B in their drawings.

Table 6: Percentage for the use of Golomb's Representational Theory in Group C children's drawings of a garden with trees, flowers, and insects

Golomb's Representational Theory	E1	E2	E3
Group C	64 36.36%	54 30.68%	58 32.95%

N=176
Key: E1= Line; E2: Shape; E3: Colour

Upon studying the three groups, children become increasingly conscious of their surroundings as they get older (Lowenfeld & Brittain, 1987). They tend to create and apply visual representations of the objects they come into contact within their surroundings. As a result, they tend to create a set of symbols to represent the concepts that may not be proportional to the actual items. This result agrees with studies that suggest that most young children used variety and repetitive lines or shapes to create pictures for conveying their ideas (Acer & Karaman Benli, 2019; Didkowska, 2016). Therefore, the studies are found to be consistent with the findings. As for the age 9-12 as mentioned by Lowenfeld and Brittain (1987) and Kellog (2015), this stage is a developmental stage of dawning realism, the children tend to draw their art objects in a smaller scale with more details unlike children age between 7-8 years. They start to realise that the symbols do not represent the real images. This is evident from the findings of Deaver (2009) which the researcher found that older children tend to add more details into their drawings such as the use of colour and space compared to the 7-8 years old. The closed the child approaches adolescence, he or she loses the strong subjective relationship to the world of symbols.

According to Lowenfeld and Brittain (1987) and Kellog (1970), children between the ages of 9 and 12 are in a stage of development known as dawning realism, often draw objects in smaller sizes and pay closer attention to details. They may start incorporating concepts such as shading, perspective, and proportion into their drawings. The developmental stages of children art, children progress through various stages of artistic

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development (Lowenfeld & Brittain, 1987). During the dawning realism stage, children begin to move away from symbolic representation and strive for greater accuracy and detail in their artwork. This is demonstrated by the research of Deaver (2009), who discovered that older children tend to add more details to their drawings than children aged 7-8, such as the use of colour and space. The children lose a strong subjective connection to the world of symbols as they get closer to adolescence. Therefore, the general concept of children gaining a better understanding of visual representation and incorporating more details into their artwork as they mature aligns with widely accepted theories of artistic development. Older children were more likely to create the pictures with more complicated structural elements. In addition, Group C children added additional things to their drawings, like humans, playground, sun demonstrating that the older children had a bigger perspective on the objects as suggested by Farokhi and Hashemi (2011). Older children experimented with changing the brightness of a color to represent distance or to unify a composition, for example (Golomb, 2004).

What is the relationship between children's uses of Golomb's representational theory in graphic schemata drawings with their age?

Table 7 shows the Chi-Square analysis of relationship between children's uses of Golomb's representational theory in graphic schemata drawings with their age. The *p*-value (.002) found in the "Asymptotic Significance (2-sided)" column is less than the designated alpha level of .005, indicating a significant result. In simple terms, the data suggests an association between Golomb's representational theory and graphic schemata drawings of Group A age is associated with each other.

Table 7: The Chi-Square analysis for the relationship between children's uses of Golomb's representational theory in graphic schemata drawings with their age (Group A)

	Value	df	Asymp. Sig. (2 sided)
Pearson Chi-Square	6.000a	4	.002
Likelihood Ratio	6.592	4	.002
Linear-by-Linear Association	1.945	1	.002
N of Valid Cases	3		

a. 9 cells (100.0%) have expected count less than 5. The minimum expected count is .33.

Table 8 shows the Chi-Square analysis of relationship between children's uses of Golomb's representational theory in graphic schemata drawings with their age. The *p*-value (.003) found in the "Asymptotic Significance (2-sided)" column is less than the designated alpha level of .005, indicating a significant result. In simple terms, the data suggests an association between Golomb's representational theory and graphic schemata drawings of Group B age is associated with each other.

Table 8: The Chi-Square analysis for the relationship between children's uses of Golomb's representational theory in graphic schemata drawings with their age (Group B)

	Value	df	Asymp. Sig. (2 sided)
Pearson Chi-Square	6.000a	4	.003
Likelihood Ratio	6.592	4	.003
Linear-by-Linear Association	1.820	1	.003

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N of Valid Cases	3

a. 9 cells (100.0%) have expected count less than 5. The minimum expected count is .33.

Table 9 shows the Chi-Square analysis of relationship between children's uses of Golomb's representational theory in graphic schemata drawings with their age. The *p*-value (.002) found in the "Asymptotic Significance (2-sided)" column is less than the designated alpha level of .005, indicating a significant result. In simple terms, the data suggests an association between Golomb's representational theory and graphic schemata drawings of Group C age is associated with each other.

Table 9: The Chi-Square analysis for the relationship between children's uses of Golomb's representational theory in graphic schemata drawings with their age (Group C)

	Value	df	Asymp. Sig. (2 sided)
Pearson Chi-Square	3.000a	2	.002
Likelihood Ratio	3.819	2	.002
Linear-by-Linear Association	1.143	1	.002
N of Valid Cases	3		

a. 6 cells (100.0%) have expected count less than 5. The minimum expected count is .33.

5. Conclusion

The objectives of this research are (i) to quantify the most common Golomb's representational theory that children used in their drawings of a garden with trees, flowers, and insects, (ii) to determine the use of Golomb's representational theory in children's drawings of a garden with trees, flowers, and insects according to their age; and (iii) to measure the relationships between children's uses of Golomb's representational theory in graphic schemata drawings with their age. Based on the descriptive statistics for the use of Golomb's representational theory in the young children's drawings of a garden with trees, flowers, and insects the researcher reported that *E1* (line), 35.68% is the most common Golomb's representation that children used in their drawings. This is followed by E2 (shape), 32.30% and then E3 (colour) with 32.03%. Secondly, in examining the use of Golomb's representational theory in children's drawings according to their age, the sample of children was divided into 3 age groups. Group A is children who age 7 to 8; Group B is children who age 9 to 10 and Group C is children who age 11 to 12. The results showed that *E2* (shape) were found to be most prominent in their drawings with a percentage of 34.12%. As for Group B, *E1* (line) found to be most prominent element used in their drawings with a percentage of 36.59%. Similarly, to Group B, Group C, *E1* (line) also found to be the most prominent element used in their drawings with a percentage of 36.36%. Lastly, this study analysed the connections between children's drawings with representational theory of Golomb and children graphic schemata drawings. The Chi-square test, an inferential statistic was performed on each key aspect of representational theory namely line, shape and colour. The analyses were tested at .05 alpha level for significance. The third research question revealed that all Golomb's representational theory were significant to children's graphic schemata drawings for Group A, B and C.

In conclusion, children's art is a powerful tool for self-expression, emotional release, and development. They can communicate ideas and emotions that they might find difficult to put into words, which helps them manage stress and control their emotions. Children

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who create art also have improved critical thinking, fine motor skills, hand-eye coordination, problem-solving, and decision-making abilities. Through art courses, museums, and community events, art educators may provide kids the chance to experiment with different art forms, materials, and techniques, which is a vital part of nurturing a love for art. Children's artwork gives them a platform to express themselves, but educators can also help them discover their own potential, learn valuable skills, and appreciate the beauty of their individual viewpoints.

Future scholars could experiment with different task conditions or drawing themes using Golomb's representation theory. Other recognizable themes, such as family, animals, objects, or descriptive scenery, might be offered to children so that their drawings can be evaluated. Also, future researchers can study children art using other various children art theories. The data from children's drawings was collected and analyzed using quantitative approaches in this study. Qualitative research, intrinsic case study can be used to conduct similar studies to gain in-depth insights into children's drawing qualities. An interview with a group of children can be conducted to obtain feedback on their drawings. Additionally, their drawings might be observed to extend the existing findings by the way they draw. Future researchers also can further their studies by collecting data from other schools or make a comparison study. As a result, researchers able to better comprehend and present the uniqueness of children's drawings.

Ethics Approval and Consent to Participate

All procedures performed in this study involving human participants were conducted following ethical standards of the institutional research committee.

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Conflict of Interest

The authors declare no conflicts of interest.

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